

# Cell Renewal Systems in the Gut of the Oyster,

## *Crassostrea gigas*<sup>1, 2</sup>

(Mollusca : Bivalvia)

BY

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(2 Plates)

THERE HAS RECENTLY BEEN much interest in the field of oyster histopathology in relation to disease, experimental wound repair, inflammation, and effects of various insults on certain tissues. However, except for the origin of oyster blood cells, which has interested biologists for many years, there have been virtually no studies or reports concerned with basic cell renewal systems of any oyster tissue.

There are a few scattered reports of mitotic figures observed in the digestive tissues of *Crassostrea virginica* (Gmelin, 1791) (YONGE, 1926; SHAW & BATTLE, 1957; HILLMAN, 1963), but their relation to cell renewal systems was not described. SHAW & BATTLE (*op. cit.*), and GALT-SOFF (1964), among others, have reported that cells from the crypts of the digestive tubules replace the secretory absorptive cells of the tubule in *C. virginica*. However, this has not been closely examined and details are lacking.

Thus, with the possible exception of the germinal epithelium of the gonad, no reports of mitosis, in relation to normal cell renewal systems, have been recorded for oyster tissues. The purpose of this paper is to describe two cell renewal systems observed in the gut of *Crassostrea gigas* (Thunberg, 1793).

### METHODS AND MATERIALS

The basic cell renewal system of the gut epithelial cell was determined by microscopic examination of 25 oysters after fixation with Davidson's fluid, routine tissue process-

ing, sectioning, and staining. Six-micron sections were stained with Harris' hematoxylin and eosin, Mallory's aniline blue collagen stain for oyster tissue (PAULEY, 1967), or methyl green-pyronin Y for differentiating nucleic acids (GURR, 1965). Cell renewal systems for two different cell types were elucidated by noting the location of mitotic figures, pre-, and post-mitotic nuclei.

Some quantitative data, relative to the frequency of mitosis, were obtained for gut epithelial cells by counting the total number of mitotic figures in 17 6 $\mu$  sections from each of 18 randomly selected oysters according to the following scheme: 3 consecutive sections were taken every 75 - 100 $\mu$  from a 6 mm section of the ascending limb from the same area in each oyster. Mitotic figures were defined as those cells that were clearly dividing (*i. e.*, early metaphase, metaphase, anaphase, or telophase) or had recently divided and the 2 resulting cells had not separated.

### RESULTS AND DISCUSSION

Only a brief description of the basic cell renewal system of the gut epithelial cell will be given since cell labeling with radioactive tracers - necessary for a more precise analysis - was not part of this study.

Gut epithelial cell nuclei normally lie in a plane midway between the basement membrane and the distal portion of the epithelial cell (Figure 1). Prior to cell division, the nucleus migrates to the distal portion of the cell where it subsequently divides (Figure 2). The mechanics of this process are not understood but are similar to that seen in mammalian epithelial cells. Once mitosis has occurred, the resulting 2 nuclei (Figure 3) move back to their normal position in the cell population.

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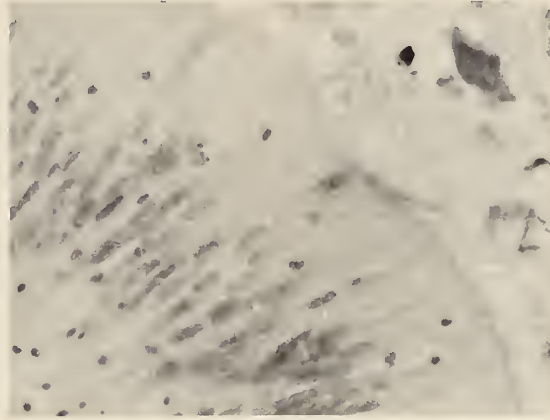


Figure 1



Figure 2



Figure 3

Figure 1: Oyster gut epithelium. Note that the epithelial cell nuclei normally lie midway between the basement membrane and the distal surface

( $\times 480$ )

Figure 2: Mitosis (arrow) of an epithelial cell after nuclear migration

( $\times 1200$ )

Figure 3: Two adjacent epithelial nuclei, formed after mitosis, still in the distal portion of the epithelium

( $\times 1200$ )